HEARING CONSERVATION PROGRAM

NOISE MEASUREMENT and CONTROL

28 Jan 2013

Learning Objectives

1. Define hazardous noise re: military service regulations
2. State the purposes of noise surveys
3. Identify noise measurement equipment
4. Explain the major methods of measuring noise

Hazardous Noise Levels

Time person can be exposed without hearing protection before there is damage to the ear
Re: DODINST 6055.12

Exchange Rate = 3 dB

Noise Level – dBA	Exposure Time
85	8 hours
88	4 hours
91	2 hours
94	1 hour
97	30 min
100	15 min
103	7.5 min

What Matters Most …

TYPICAL NOISE LEVELS	dBA
Soft whisper	30
Normal conversation	55
Bird singing	60
Vacuum cleaner	70
Normal street traffic	75
Alarm clock ringing	80
Heavy city traffic	92
Punch press	100
Steel plate falling	105
Hard rock music	110
Jet passing overhead	115
Jack hammer	120

DURATION OF EXPOSURE	
A	
88	4 hrs
91	2 hrs
94	1 hr
97	30 mins
100	15 mins
103	7 mins, 30 secs
106	~ 3 mins, 45 secs
109	~ 1 min, 45 sec
112	~ 1 min
115	~ 30 secs
118	~ 15 secs
121	~ 7.5 secs
124	~ 3 secs
127	~ 1 sec

Noise Hazard Evaluation

"Noise Survey"

Details later about each of these purposes

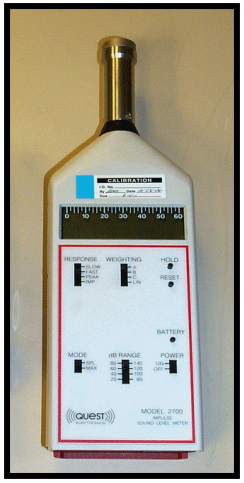
1. **Identify sources of hazardous noise re: equipment, areas, operations**
2. **Determine if engineering controls can reduce or eliminate noise hazards**
3. **Identify and label noise hazards**
4. **Recommend enrollment of personnel in the HCP**

Responsibility for Noise Surveys

1. **Industrial Hygienists (IH) have primary responsibility**
2. **Audiologists**
3. **Trained technicians under IH supervision**

OHC Technician is <u>NOT</u> directly responsible for noise evaluation and control

Noise Measurement Equipment



Sound Level Meters (SLM)
screen environmental areas or spaces for noise hazards

Dosimeters
measure average noise levels an individual worker is exposed to over 8 hours

Octave Band Analyzers
measure intensity of specific ranges or bands of frequencies in equipment noise

Sound Level Meter (SLM) Facts

Two types – Both can be used in HCP

TYPE 1

Precision SLM

Very expensive

Very accurate ± 1 dB

Used for octave band measurements, audiometer calibration, sound booth certification

TYPE 2

General purpose in field

Less expensive – "rugged"

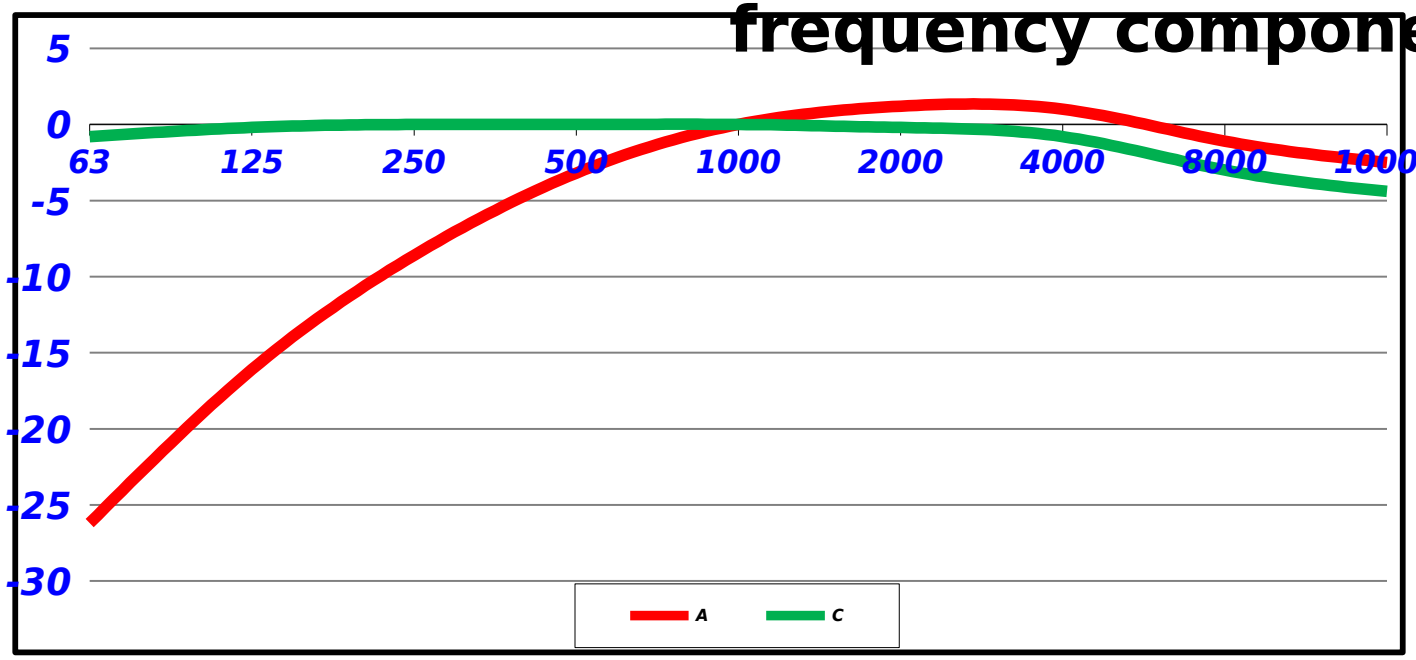
Accurate ± 2 dB

Used for screening and environmental samples

SLM Weighting Scales

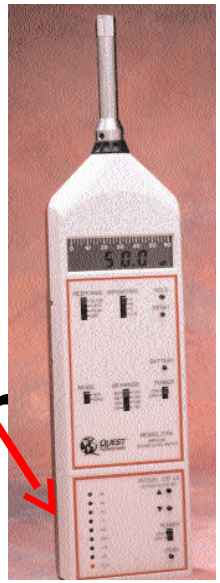
C Scale: almost all frequencies are measured
A Scale: reduces intensity in low frequencies to reflect human hearing sensitivity

If dBC value > dBA value = noise has significant low frequency component



Octave Band Analyzer Facts

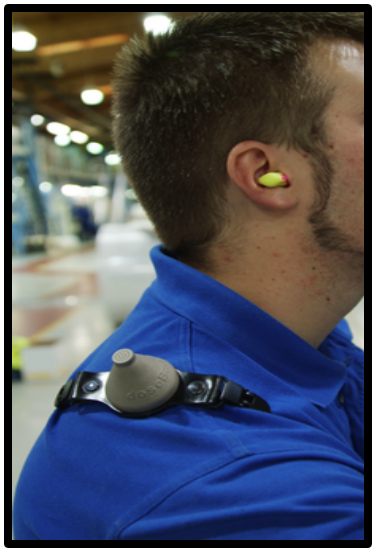
1. Measures SPL intensity of sound in specific frequency ranges
2. Provides guidance on engineering solutions for noise control
3. Available as part of SLM or as a filtering attachment
4. Used to calibrate audiometer and certify sound booths



Dosimeter – Dosimetry Facts

Measures Time Weighted

- **Average**
  - **average dBA exposure**
  - **projected over 8 hrs**
  - **accounts for noisy and quiet periods**

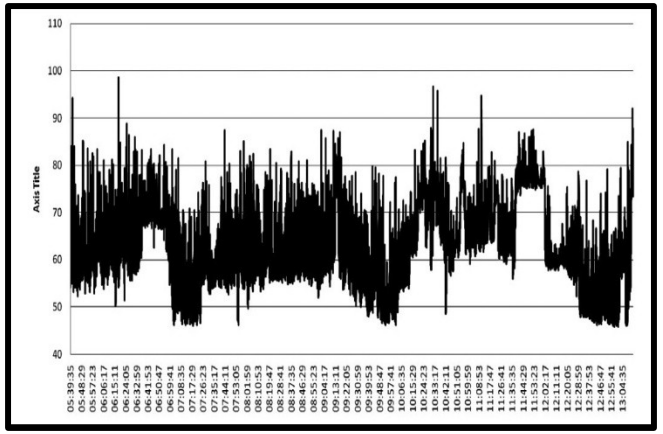


Only reliable method for

- **determining noise dose of individual employees**

Dosimeter worn by employee

- **various sampling methods**



Step 1: Identify Sources of Hazardous Noise

A. Hazardous Noise is ≥ 85dBA or ≥ 140 dB Peak

B. Identify primary noise sources by :

Screening	continuous, intermittent, impulse
Mapping	noise levels within area
Time studies	by location and operations
Dosimetry	workers' TWA exposures
Octave band analysis	specific frequencies

C. Identify ototoxins increasing susceptibility to NIHL : heavy metals, organic solvents, asphyxiants, and drugs

Step 2: Engineering Controls

A. Defined as controlling noise at the source, blocking the path to receiver or making a change to procedure or process.

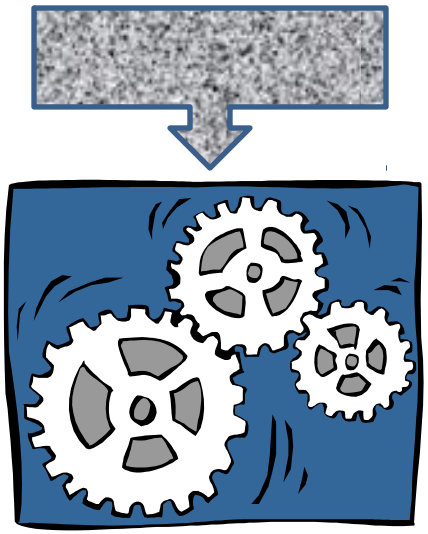
B. Primary means of protecting personnel from hazardous noise

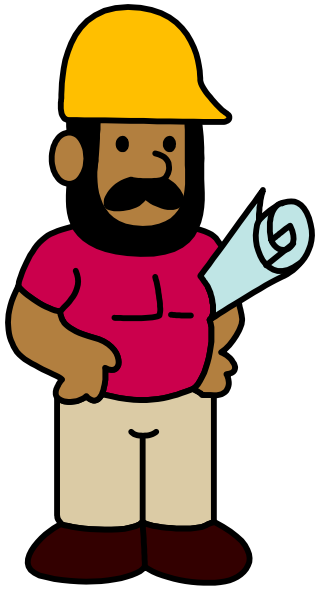
C. Engineering control study is mandated where workers are exposed to noise > 100 dBA for ≥ 4 consecutive hours

D. Engineering controls include any or a combination of approaches

Engineering Controls

Damping

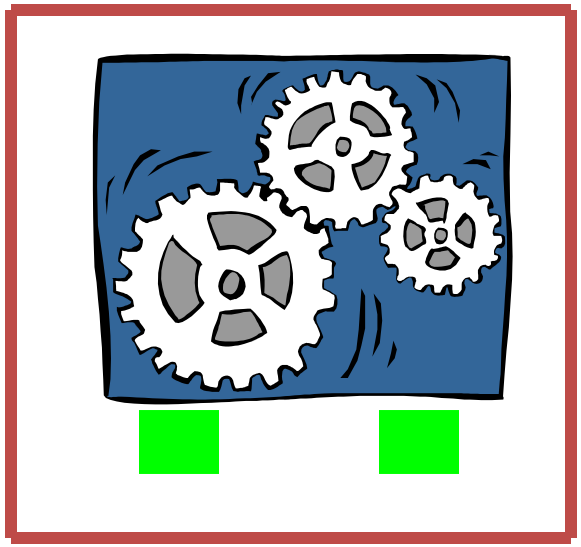


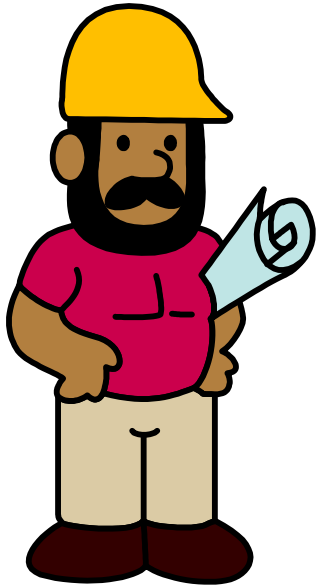


Change Procedure
or Process

Engineering Controls

Isolation

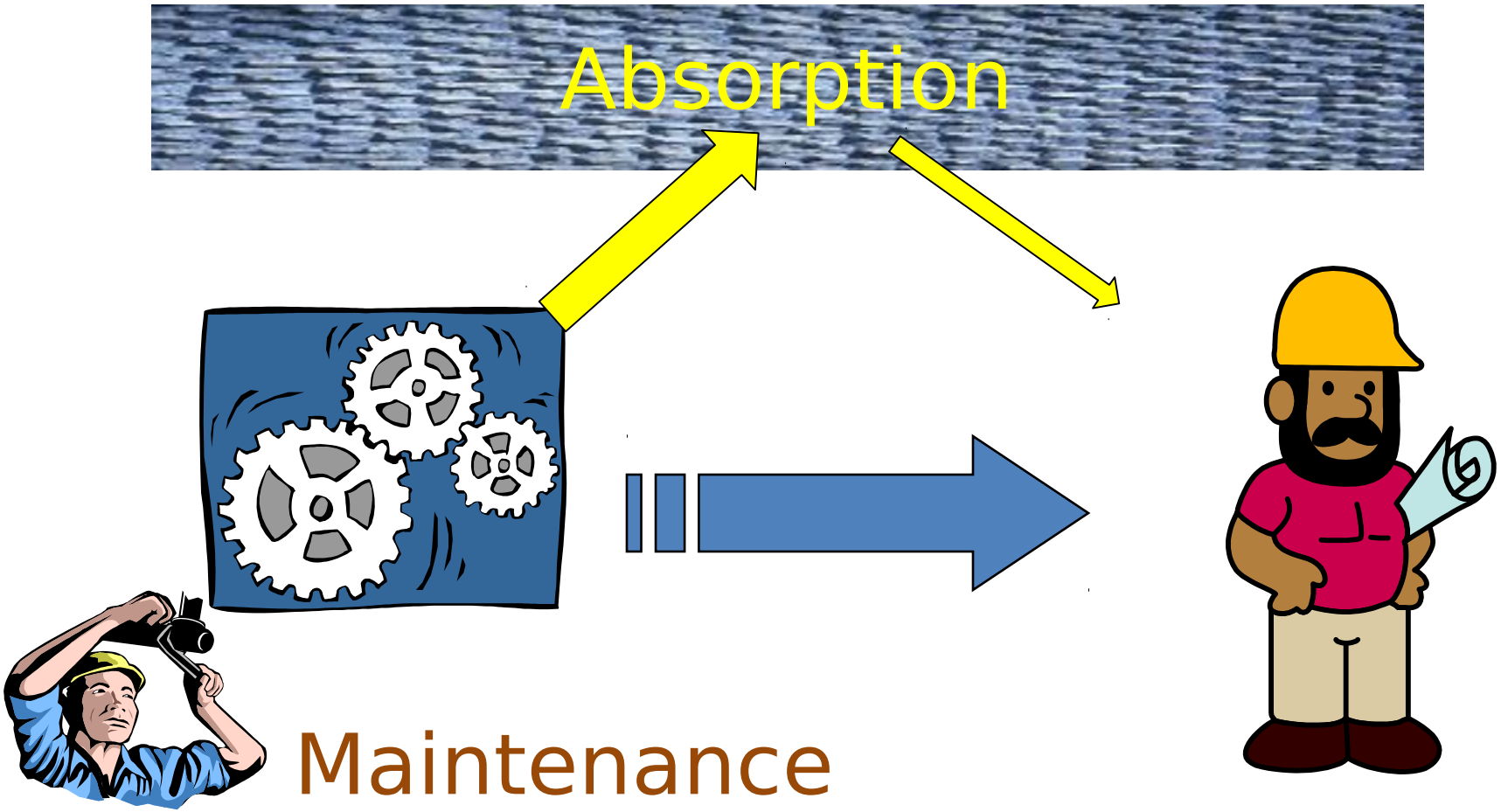




Suspension or Enclosure

Barrier & Enclosures

Engineering Controls



Step 3: Label Noise Hazards

Signs and labels inform workers when it is necessary to wear hearing protection

Signs are placed on doors only if entire space is noise hazardous

Exception: no labels on combat equipment and tactical vehicles

Step 4: Recommend Enrollment of Personnel in the HCP

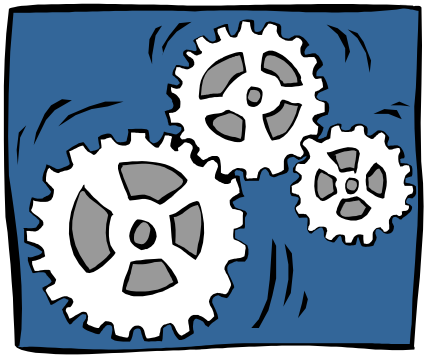
A. Enrollment criteria based on ≥ 85dBA TWA

B. Absence of noise data does not prevent HCP enrollment

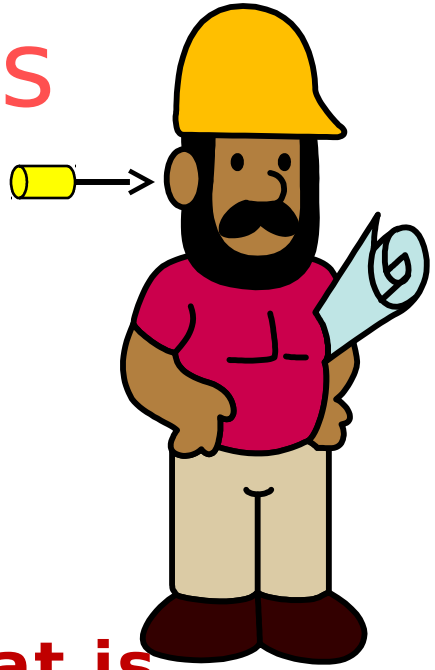
C. HPD use required in identified hazardous noise areas <u>regardless</u> of worker enrollment in HCP

D. Administrative Controls are used to limit exposure time by rotating, removing, substituting workers

Personal Noise Controls



HPDs



Type of Noise Control that is responsibility of OHC Technician

- ***fitting employees with HPDs and educating them in proper use and care***

Hearing Protection Requirements

DoD "Action Level"

Use of single HPD at noise levels

≥ 85 dBA continuous sound

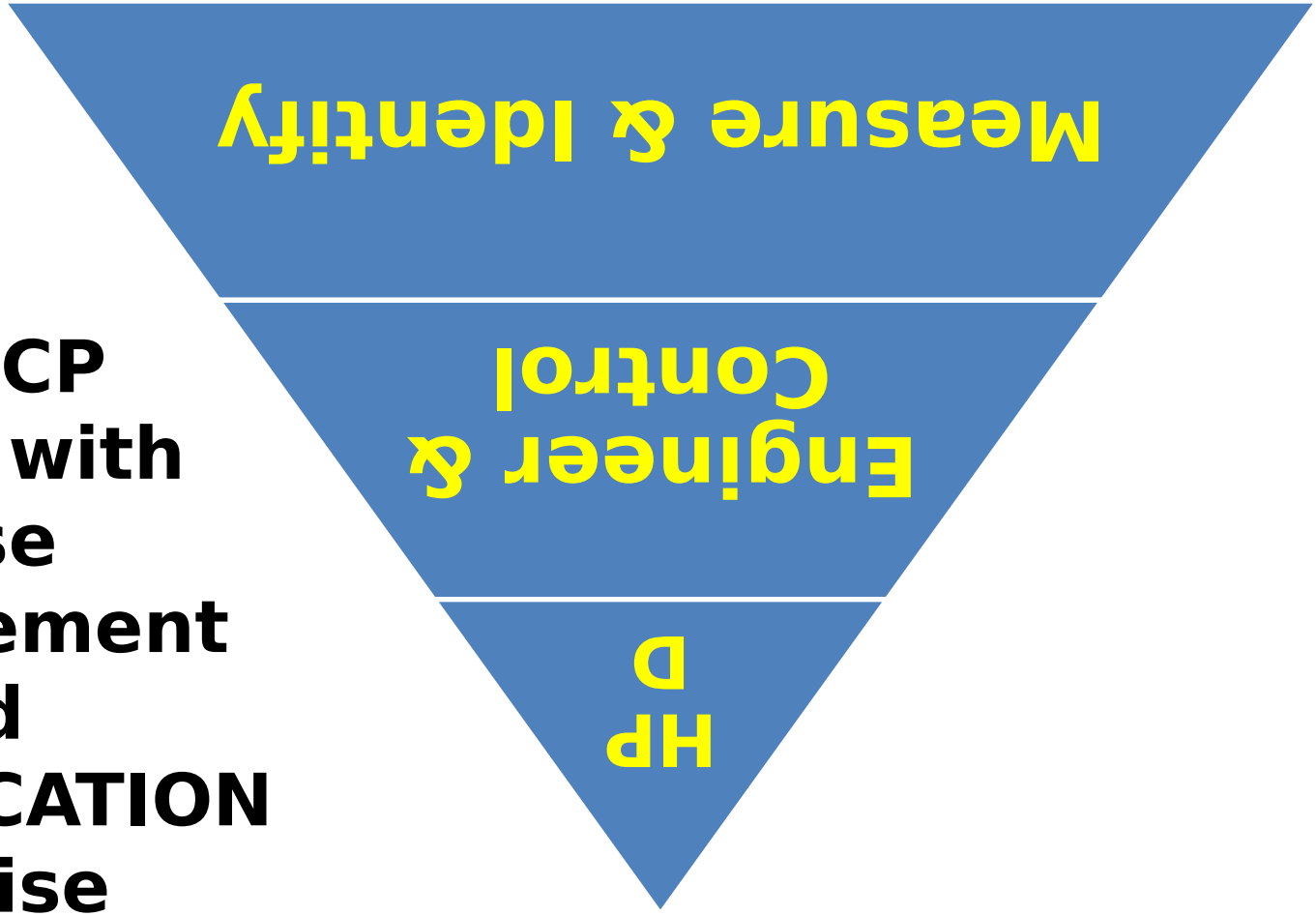
≥ 140 dBP impulse/impact sound

Use of double HPD at noise levels

> 96 dBA continuous sound

Summary

The HCP begins with noise measurement and IDENTIFICATION of noise hazards.



Questions?

Explosions/IED's
(180 dB+)

Aircraft Launch
(170 dB+)

M-16 (130-150dB)

Screaming
DI
(100dB)